A Study on Expiration Effects of Stock Future on Price and Volume of Underlying Stocks with Reference to Indian Capital Market

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ABSTRACT

India is one of the fastest developing economy with having International Stock Exchanges like NSE and BSE. The Stock Futures have been seen as a factor causing instability in Spot market. The paper is an effort to investigate the effects of Individual Stock futures expiration effect on underlying Stocks of 19 different sectors listed on NSE based on their Price and Volume analysis. By using daily data of 131 stocks (Out of 139 Stock of Future) based on data availability and stocks working in F&O segment we have found overall negative effect of stock futures on price and volume pre and post the expiration day.

Keywords: Event Study Approach, Price and Volume analysis, Stock Futures

I. INTRODUCTION

One of the most financial innovations in Indian Stock markets and World Markets was an introduction of Future Contracts in last decade. The major objective of such significant change in financial market was to maintain the risk in the financial investment strategies. India has introduced various financial derivative instruments to maintain level of competency and quality of Indian market at par with the world markets. One of the major introductions was the Stock Futures on 9th November, 2001 with limited common shares on NSE. Over a period of time the scope of stock futures on NSE has widened. The increasing use of stock futures in the market has raised the question of its probable impact on other securities in the market specifically the underlying Stocks. The Paper attempts to investigate the effects of stock futures expiration on the price and volume of such underlying stocks.

The expiration day effect may be defined as the effect on prices and volumes of securities as traders adjust their positions shortly before the expiration of options and futures contracts (Anvaer Sadath and B Kamaiah). The expiration effects arises mainly from various sources (Stoll and Whaley,1997). These effects mainly

come from three sources like Arbitrage Positions (Cash Settlement), Market Price Manipulation (Market Adjustments) and Market Procedures.

The arbitraging is the activity in the market where positions are unwind in future market due to change in future price of stocks from its fair value considering its cost of carry relationship. If significant change in liquidating such positions at the same time is seen in same direction, significant price change is noted. Though Cost of Carry element is only useful when the cost involved is comparatively low to arbitraging profit of the position.

The other activity is market price manipulation which affects the stock futures on price and volume. When the future positions of the investors and traders are open with either notional loss or profit. They need to react in respect to the settlement price and have to make some adjustments in their positions. These adjustments lead to square off or addition of position in future which leads price to move in favorable directions.

The third condition of stock market procedure also leads to the expiration day effects. The price effects on expiration is a part of stock market procedure which requires accommodation of order imbalance that arises due to arbitrage positions are unwound. If the market of particular underlying stocks is deep and suppliers of liquidity (Buyers) are quick to respond to selling or buying pressure, the price effects of large arbitrage unwinding will be small. If the investor is aware with the unjustified price of stocks they would remain ready to buy the underpriced stocks and sell overpriced stocks that would limit the price fluctuation within the limit of its transaction costs. If the market mechanism is not developed to absorb sudden imbalances the price fluctuation or effects may be substantial. In case of stock futures the settlement of transactions are done at the closing prices.

The rest of the paper is organized as follows. II – Literature Review, III - Research Methodology are explained in this part of paper followed by IV and V part explaining the Empirical result and Conclusion respectively.

Stock Futures in the NSE

Stock Futures are standardized agreement between two parities to buy or sell underlying assets for settlement or delivery at pre-determined future date at specified price in the contract. According to the NSE characteristics of such

futures contract are underlying securities (Equity, Commodity etc.), Buy and Sell of assets in stipulated quantity (Lot Size), Standardized Price along with the maturity date.

All future contracts are having 3 months of trading cycle called – The Near Month (One), The Next Month (Two) and the Far Month (Three). All new contracts are introduced on the trading day following the expiry of the near month contracts. All contracts expire on last Thursday of every month called "Expiry". If the last Thursday is holiday for trading, the expiry takes place on its previous day that is Wednesday. On the Contract day the base price will be the theoretical futures price and on subsequent trading days it will be equal to the daily settlement price of futures contracts.

The Futures and Options Trading at NSE is provided through VSAT (Very Small Aperture Terminal) system which provides Screen-based, floor-less trading nationwide through its networking. Complete transparency is maintained in settlement through National Securities Clearing Corporation Limited (NSCCL) in Clearing and Settlement of Contracts.

II. LITERATURE REVIEW

Various studies of expiration effect of derivatives on underlying stocks had been carried in past related to index derivative or stock options. Anver Sadath and B Kamaiah have noted positive abnormal return of the underlying securities in their studies. Whle Pope and Yadav(1992) found negative effect of option expiration on the returns. Another study by Cinar and Vu (1987) recoded significant positive return for one stock and significant negative return for another stock and insignificant for remaining four stock out of their study of six underlying Stocks.

Stoll and Whaley (1986, 1987, 1990, 1991), Feinstein and Goetzmann (1988), Herbst and Maberly (1990), Hancock (1993), and Chen and Williams (1994) in their studies on the expiration day effects of the US index derivatives, and Karolyi's (1996) investigation of the expiration day effect of Nikkei 225 futures contracts, noted that all index derivatives expiration have resulted in the abnormal trading in the underlying market and price effect is negligible. Schlag (1996) reported significant increase in trading volume for both index futures and options expirations in Germany.

From the above review of various literatures it is evident that the majority of studies had been noted based on their study of Expiration of option contract and effects on price and volume of underlying stocks. This leads to an open window for the study of expiration effect on future contracts on price and volume of underlying stocks.

III. RESEARCH METHODOLOGY

A) Objectives of the study

The study is conducted mainly to serve the following objectives

1. To study the expiration effect of stock futures on price and volume of underlying Securities.
2. To study the movement of price and volume during the study period.

B) Hypothesis:

Ho: Stock Futures Expiration does not have effect or impact on Stock Price and Volume of Auto Sector.

Ho: Stock Futures Expiration does not have effect or impact on Stock Price and Volume of Cement Sector.

Ho: Stock Futures Expiration does not have effect or impact on Stock Price and Volume of Chemical Sector.

Ho: Stock Futures Expiration does not have effect or impact on Stock Price and Volume of Construction Sector.

Ho: Stock Futures Expiration does not have effect or impact on Stock Price and Volume of Consumer Goods Sector.

Ho: Stock Futures Expiration does not have effect or impact on Stock Price and Volume of Fertilizer & Pesticides Sector.

Ho: Stock Futures Expiration does not have effect or impact on Stock Price and Volume of Health Care Service Sector.

Ho: Stock Futures Expiration does not have effect or impact on Stock Price and Volume of Financial Service Sector.

Ho: Stock Futures Expiration does not have effect or impact on Stock Price and Volume of Industrial Manufacturing Sector.

Ho: Stock Futures Expiration does not have effect or impact on Stock Price and Volume of Media and Entertainment Sector.

Ho: Stock Futures Expiration does not have effect or impact on Stock Price and Volume of Metal Sector.

Ho: Stock Futures Expiration does not have effect or impact on Stock Price and Volume of Information and Technology Sector.

Ho: Stock Futures Expiration does not have effect or impact on Stock Price and Volume of Oil & Gas Sector.

Ho: Stock Futures Expiration does not have effect or impact on Stock Price and Volume of Paper Sector.

Ho: Stock Futures Expiration does not have effect or impact on Stock Price and Volume of Pharma Sector.

Ho: Stock Futures Expiration does not have effect or impact on Stock Price and Volume of Power Sector.

Ho: Stock Futures Expiration does not have effect or impact on Stock Price and Volume of Service Sector.

Ho: Stock Futures Expiration does not have effect or impact on Stock Price and Volume of Textile Sector.

Ho: Stock Futures Expiration does not have effect or impact on Stock Price and Volume of Telecom Sector.

In order to study the impact of Stock Futures expiration on the underlying stocks, an event study approach has been used. The event here is expiration of stock future contracts. The study only covers the expiration of near month contracts as trading of middle and far months contracts are not active as the contracts of near months in the NSE.

As future expiration takes place on last Thursday of any month for the study purpose last Thursday (30/1/2020) has been considered randomly with event window of + / - 7 days with estimation window of 90 days (Appr.3 months).

To find the actual return of sample stocks for both Event Window and Estimation Window following methodology has been used.

$$Rit = \frac{(Pit - Pit - 1)}{Pit - 1} \quad \text{.......} (01)$$

Where, Rit = Return on Stock i in the Period t

Pit = Price of Security i in the period t

Pit-1 = Price of Security i in the period t-1

The abnormal return for all the stocks has been calculated using the constant mean return model. After obtaining the mean return of all the sample stock the abnormal return had been calculated following formula:

$AR_{it} = R_{it} - E(R_{it})$

Where, A R_{it} = Current Day Abnormal Return

R_{it} = Current Day Normal Return

E (R_{it}) = Expected Return

The calculated abnormal return is further converted into cumulative abnormal return to apply statistical technique. Cumulative abnormal return is calculated for both before and after event date.

$$CAR = \sum_{j}^{n} ARj \quad \text{.......} (02)$$

Where, ARj= Abnormal return of jth company

The mean CAR is calculated as:

$$\overline{CAR} = \frac{\sum_{i}^{n} CARi}{n} \quad \text{.......} (03)$$

Where, $\overline{CAR}$ = Mean of Cumulative Abnormal Returns.

CARi = Cumulative Abnormal Returns on ith day.

n = Number of Days.

The standard deviations for all the stock has been calculated for pre and post event. It is calculated as:

$$\sigma = \sqrt{CAR/n} \quad \text{.....(04)}$$

Where, CAR = Cumulative Abnormal Returns.

n = Number of Days.

C) Statistical Techniques

To test the hypotheses in the study, t - test has been applied to find the impact of bonus issue announcement on stock return (abnormal or normal) on sample companies in pre and post time line. The t value is calculated with the formula given below:

$$t = \frac{\overline{CAR}}{\left[\sigma \frac{\overline{CAR}}{\sqrt{N}}\right]} \quad \text{.....(05)}$$

The t - value was further compare to the table value of significance to test the significance of the result.

IV. DATA AND EMPIRICAL RESULTS

To study the empirical result of the study mainly 3 tools i.e. mean CAR, standard deviation, t – value have been used. Mean CAR in 7 periods i.e. before and after 7 / 5 / 3 / 2 / 1 day before and after Expiry day. Standard deviation and t – value has been calculated for the same period and is detailed in table.

The trend of CARs for the sample companies over various periods has been detailed in table. From the data analysis following findings has been obtained.

1) Table 1 shows calculated values of mean, standard deviation and t- value of stock prices and volume for the automobile sector companies. The calculated value of t - test in case of stock price is -1.29 and for Volume it is – 1.18, which is less than the tabulated value for the same. Hence, hypothesis is accepted.

2) Table 2 shows calculated values of mean, standard deviation and t- value of stock prices and volume for the cement & cement product sector

companies. The calculated value of t - test in case of stock price is -2.06 and for Volume it is –3.41, which is less than the tabulated value for the same. Hence, hypothesis is accepted.

3) Table 3 shows calculated values of mean, standard deviation and t- value of stock prices and volume for the Chemical sector companies. The calculated value of t - test in case of stock price is 0.88 and for Volume it is 0.60, which is less than the tabulated value for the same. Hence, hypothesis is accepted.

4) Table 4 shows calculated values of mean, standard deviation and t- value of stock prices and volume for the Construction sector companies. The calculated value of t - test in case of stock price is -1.55 and for Volume it is – 0.81, which is less than the tabulated value for the same. Hence, hypothesis is accepted.

5) Table 5 shows calculated values of mean, standard deviation and t- value of stock prices and volume for the Consumer goods sector companies. The calculated value of t - test in case of stock price is -0.25 and for Volume it is – 0.21, which is less than the tabulated value for the same. Hence, hypothesis is accepted.

6) Table 6 shows calculated values of mean, standard deviation and t- value of stock prices and volume for the Fertilizer & Pesticides sector companies. The calculated value of t - test in case of stock price is -1.43 and for Volume it is – 2.55, which is less than the tabulated value for the same. Hence, hypothesis is accepted.

7) Table 7 shows calculated values of mean, standard deviation and t- value of stock prices and volume for the Healthcare Service sectors companies. The calculated value of t - test in case of stock price is 0.25 and for Volume it is –4.27, which is less than the tabulated value for the same. Hence, hypothesis is accepted.

8) Table 8 shows calculated values of mean, standard deviation and t- value of stock prices and volume for the Industrial Manufacturing sector companies. The calculated value of t - test in case of stock price is -1.2 and

for Volume it is –3.90, which is less than the tabulated value for the same. Hence, hypothesis is accepted.

9) Table 9 shows calculated values of mean, standard deviation and t- value of stock prices and volume for the IT sectors companies. The calculated value of t - test in case of stock price is -0.17 and for Volume it is –1.43, which is less than the tabulated value for the same. Hence, hypothesis is accepted.

10) Table 10 shows calculated values of mean, standard deviation and t- value of stock prices and volume for the Financial Service sectors companies. The calculated value of t - test in case of stock price is -0.62 and for Volume it is –1.24, which is less than the tabulated value for the same. Hence, hypothesis is accepted.

11) Table 11 shows calculated values of mean, standard deviation and t- value of stock prices and volume for the Media & Entertainment sector companies. The calculated value of t - test in case of stock price is -1.24 and for Volume it is –2.38, which is less than the tabulated value for the same. Hence, hypothesis is accepted.

12) Table 12 shows calculated values of mean, standard deviation and t- value of stock prices and volume for the Metals sector companies. The calculated value of t - test in case of stock price is -2.2 and for Volume it is –2.15, which is less than the tabulated value for the same. Hence, hypothesis is accepted.

13) Table 13 shows calculated values of mean, standard deviation and t- value of stock prices and volume for the Oil & Gas sector companies. The calculated value of t - test in case of stock price is -1.42 and for Volume it is –4.11, which is less than the tabulated value for the same. Hence, hypothesis is accepted.

14) Table 14 shows calculated values of mean, standard deviation and t- value of stock prices and volume for the Paper sectors companies. The calculated value of t - test in case of stock price is 2.77 and for Volume it is 0.8, which is less than the tabulated value for the same. Hence, hypothesis is rejected.

15) Table 15 shows calculated values of mean, standard deviation and t- value of stock prices and volume for the Pharma sector companies. The calculated value of t - test in case of stock price is -1.10 and for Volume it is – 1.38, which is less than the tabulated value for the same. Hence, hypothesis is accepted.

16) Table 16 shows calculated values of mean, standard deviation and t- value of stock prices and volume for the Power sector companies. The calculated value of t - test in case of stock price is -1.44 and for Volume it is –0.58, which is less than the tabulated value for the same. Hence, hypothesis is accepted.

17) Table 17 shows calculated values of mean, standard deviation and t- value of stock prices and volume for the Service sector companies. The calculated value of t - test in case of stock price is -0.70 and for Volume it is –1.66, which is less than the tabulated value for the same. Hence, hypothesis is accepted.

18) Table 18 shows calculated values of mean, standard deviation and t- value of stock prices and volume for the Textile sector companies. The calculated value of t - test in case of stock price is -3.28 and for Volume it is –2.82, which is less than the tabulated value for the same. Hence, hypothesis is accepted.

19) Table 19 shows calculated values of mean, standard deviation and t- value of stock prices and volume for the Telecom sector companies. The calculated value of t - test in case of stock price is -0.58 and for Volume it is –4.93, which is less than the tabulated value for the same. Hence, hypothesis is accepted.

V. CONCLUSION

This study empirically examined the effect of stock futures expiration on both price and volume of underlying stocks in F&O segment of the National Stock Exchange in India. It is shown that futures expiration has resulted in overall negative effect on price and volume of all most all sectors. It seems that due to unwinding and adjustment on the expiry tends to bring negative effect on the price and volume of underlying scripts on the Exchange.

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List of Tables

Table 1 Average t – value matrix of Automobile Sector

	Stock Price			Volume		
Stock Name	**Mean**	**S.D.**	**t- value**	**Mean**	**S.D.**	**t- value**
AMARAJABAT	-0.51	0.95	-1.59	-32.39	27.84	-3.49
APOLLOTYRE	-0.89	1.06	-2.51	-17.64	43.58	-1.21
ASHOKLEY	-1.15	0.82	-4.19	-13.26	30.57	-1.30
BAJAJ-AUTO	0.52	0.70	2.22	72.02	297.60	0.73

	Stock Price			Volume		
Stock Name	Mean	S.D.	t- value	Mean	S.D.	t- value
BALKRISIND	-0.64	0.63	-3.08	-39.81	23.15	-5.16
BOSCHLTD	-0.94	1.28	-2.22	-4.60	43.74	-0.32
EICHERMOT	-1.22	1.37	-2.68	17.27	71.19	0.73
ESCORTS	2.11	3.10	2.04	35.30	89.39	1.18
EXIDEIND	-0.71	0.81	-2.63	-18.33	52.57	-1.05
HEROMOTOCO	0.11	0.77	0.45	-10.88	21.73	-1.50
M&M	0.03	0.83	0.12	-12.99	26.39	-1.48
MARUTI	-0.56	0.58	-2.90	-0.72	33.11	-0.07
MOTHERSUMI	-1.21	1.78	-2.05	23.87	97.32	0.74
MRF	0.00	0.53	0.01	-43.33	19.77	-6.58
TATAMOTORS	-1.07	3.33	-0.97	8.79	18.83	1.40
TVSMOTOR	-0.15	0.65	-0.72	-16.73	33.64	-1.49
Average t - Value			-1.29			-1.18

Table 2 Average t – value matrix of Cement and Cement Product Sector

	Stock Price			Volume		
Stock Name	Mean	S.D.	t- value	Mean	S.D.	t- value
ACC	-0.68	0.81	-2.52	-7.76	28.63	-0.81
AMBUJACEM	-0.84	1.06	-2.38	-34.35	15.18	-6.79
GRASIM	-0.55	0.75	-2.19	-26.02	10.79	-7.24
RAMCOCEM	-1.39	1.70	-2.46	54.57	226.72	0.72
SHREECEM	-0.06	0.99	-0.17	-22.44	19.83	-3.39
ULTRACEMCO	-0.71	0.80	-2.65	-34.30	35.13	-2.93
Average t - Value			-2.06			-3.41

Table 3 Average t – value matrix of Chemical Sector

	Stock Price			Volume		
Stock Name	Mean	S.D.	t- value	Mean	S.D.	t- value
PIDILITIND	0.83	0.83	3.02	26.28	102.85	0.77
TATACHEM	-0.23	0.54	-1.26	7.90	54.21	0.44
Average t - Value			0.88			0.60

Table 4 Average t – value matrix of Construction Sector

	Stock Price			Volume		
Stock Name	**Mean**	**S.D.**	**t- value**	**Mean**	**S.D.**	**t- value**
DLF	-0.98	1.44	-2.05	1.86	34.44	0.16
GMRINFRA	-1.07	1.25	-2.56	-22.73	19.27	-3.54
LT	-0.02	1.08	-0.04	8.57	27.53	0.93
Average t – Value			-1.55			-0.81

Table 5 Average t – value matrix of Consumer goods Sector

	Stock Price			Volume		
Stock Name	**Mean**	**S.D.**	**t- value**	**Mean**	**S.D.**	**t- value**
ASIANPAINT	0.14	0.57	0.71	-3.86	31.72	-0.37
BATAINDIA	-0.06	0.97	-0.20	-11.67	31.21	-1.12
BERGEPAINT	-0.16	1.09	-0.45	-9.25	28.87	-0.96
BRITANNIA	0.12	0.40	0.89	0.80	24.28	0.10
COLPAL	-1.60	2.30	-2.09	9.84	103.30	0.29
DABUR	0.47	1.68	0.83	55.83	281.90	0.59
GODREJCP	-1.48	2.53	-1.76	22.00	78.42	0.84
HAVELLS	-0.12	0.69	-0.51	-10.22	31.99	-0.96
HINDUNILVR	0.18	1.00	0.55	-2.53	33.05	-0.23
ITC	-0.55	1.67	-0.99	19.87	41.09	1.45
JUBLFOOD	0.83	1.98	1.26	18.83	49.91	1.13
MARICO	-0.99	2.66	-1.11	28.14	52.80	1.60
MCDOWELL-N	0.26	2.08	0.38	78.57	201.74	1.17
NESTLEIND	0.26	1.49	0.53	-8.68	42.88	-0.61
TITAN	0.02	0.92	0.07	-13.83	23.48	-1.77
UBL	0.07	0.70	0.29	-22.69	52.77	-1.29
VOLTAS	-0.53	0.60	-2.68	-35.40	31.44	-3.38
Average t - Value			-0.25			-0.21

Table 6 Average t – value matrix of Fertilizer & Pesticides Sector

	Stock Price			Volume		
Stock Name	**Mean**	**S.D.**	**t- value**	**Mean**	**S.D.**	**t- value**
UPL	-0.60	1.26	-1.43	-27.23	31.99	-2.55
Average t – Value			-1.43			-2.55

Table 7 Average t – value matrix of Health Care Sector

	Stock Price			Volume		
Stock Name	Mean	S.D.	t- value	Mean	S.D.	t- value
APOLLOHOSP	0.07	0.81	0.25	-98.13	68.87	-4.27
Average t – Value			0.25			-4.27

Table 8 Average t – value matrix of Industrial Manufacturing Sector

	Stock Price			Volume		
Stock Name	Mean	S.D.	t- value	Mean	S.D.	t- value
BEL	-2.19	3.43	-1.92	49.74	129.74	1.15
BHARATFORG	-0.64	0.91	-2.10	-118.15	20.15	-17.59
BHEL	-0.79	1.93	-1.22	-16.18	14.44	-3.36
CUMMINSIND	-0.40	1.47	-0.83	251.02	564.70	1.33
SIEMENS	-0.93	1.00	-2.80	-32.13	20.14	-4.79
SRF	0.33	0.59	1.67	-1.89	46.55	-0.12
Average t - Value			-1.20			-3.90

Table 9 Average t – value matrix of IT Sector

	Stock Price			Volume		
Stock Name	Mean	S.D.	t- value	Mean	S.D.	t- value
HCLTECH	0.18	1.20	0.46	-5.47	33.89	-0.48
INFY	0.09	0.76	0.36	-14.71	27.45	-1.61
MINDTREE	0.01	0.56	0.05	-22.82	43.99	-1.56
NIITTECH	0.11	2.91	0.12	-37.71	43.42	-2.61
TCS	-0.68	0.89	-2.30	-21.91	20.99	-3.13
TECHM	0.28	0.80	1.07	-9.49	21.55	-1.32
WIPRO	-0.33	1.06	-0.93	11.53	52.33	0.66
Average t - Value			-0.17			-1.43

Table 10 Average t – value matrix of Financial Sector

	Stock Price			Volume		
Stock Name	Mean	S.D.	t- value	Mean	S.D.	t- value
AXISBANK	-0.23	0.48	-1.44	-13.46	18.36	-2.20
BAJAJFINSV	-0.53	1.71	-0.93	13.89	58.84	0.71
BAJFINANCE	0.79	1.69	1.40	38.74	119.51	0.97

	Stock Price			Volume		
Stock Name	Mean	S.D.	t- value	Mean	S.D.	t- value
BANKBARODA	-0.53	0.73	-2.16	-6.50	19.53	-1.00
CHOLAFIN	0.19	0.39	1.44	-14.20	47.59	-0.89
EQUITAS	-0.03	1.93	-0.04	-33.65	36.86	-2.74
FEDERALBNK	-0.89	0.84	-3.16	-28.44	17.71	-4.82
HDFC	-0.67	0.77	-2.61	-12.42	27.94	-1.33
HDFCBANK	0.38	0.57	1.98	-15.34	7.94	-5.79
IBULHSGFIN	-0.93	2.13	-1.31	-17.12	21.88	-2.35
ICICIBANK	-0.55	0.70	-2.39	-17.52	17.18	-3.06
ICICIPRULI	-0.99	1.90	-1.57	31.93	107.65	0.89
IDFCFIRSTB	-0.55	2.70	-0.61	10.95	68.05	0.48
INDUSINDBK	0.09	1.55	0.18	-10.73	27.03	-1.19
KOTAKBANK	0.62	1.30	1.44	56.47	165.85	1.02
L&TFH	-0.39	1.22	-0.95	-19.89	21.08	-2.83
LICHSGFIN	-1.40	1.60	-2.62	-6.80	37.18	-0.55
M&MFIN	0.77	1.72	1.33	31.46	116.67	0.81
MANAPPURAM	-0.98	1.46	-2.02	9.57	72.34	0.40
MFSL	-0.79	1.03	-2.31	-29.46	56.32	-1.57
MUTHOOTFIN	-0.40	0.88	-1.37	-76.72	49.29	-4.67
PEL	-1.12	3.09	-1.08	12.21	22.85	1.60
PFC	0.31	1.42	0.65	-26.06	16.78	-4.66
PNB	-0.39	0.83	-1.40	-8.48	13.63	-1.87
RBLBANK	-0.60	1.44	-1.25	-25.95	23.19	-3.36
RECLTD	0.33	1.66	0.60	1.71	30.72	0.17
SBIN	-0.18	1.22	-0.43	17.43	52.02	1.01
SRTRANSFIN	-0.11	2.70	-0.13	0.27	23.68	0.03
UJJIVAN	1.32	1.45	2.73	15.69	65.67	0.72
Average t - Value			-0.62			-1.24

Table 11 Average t – value matrix of Media & Entertainment Sector

	Stock Price			Volume		
Stock Name	Mean	S.D.	t- value	Mean	S.D.	t- value
ADANIENT	-0.47	0.79	-1.81	4.88	38.77	0.38

	Stock Price			Volume		
Stock Name	Mean	S.D.	t- value	Mean	S.D.	t- value
PVR	0.16	0.60	0.79	-8.19	65.00	-0.38
SUNTV	-0.72	0.94	-2.28	-39.85	16.87	-7.09
ZEEL	-0.72	1.29	-1.67	-22.33	27.59	-2.43
Average t - Value			-1.24			-2.38

Table 12 Average t – value matrix of Metal Sector

	Stock Price			Volume		
Stock Name	Mean	S.D.	t- value	Mean	S.D.	t- value
COALINDIA	-0.75	1.22	-1.85	17.56	71.95	0.73
HINDALCO	-0.81	1.19	-2.04	-30.22	19.37	-4.68
JINDALSTEL	-0.75	1.26	-1.77	-11.56	25.72	-1.35
JSWSTEEL	-0.52	1.53	-1.02	-16.73	25.86	-1.94
NATIONALUM	-1.04	1.12	-2.78	11.53	49.82	0.69
NMDC	-0.55	0.63	-2.63	-22.84	37.91	-1.81
SAIL	-1.17	1.22	-2.86	-29.91	18.55	-4.84
TATASTEEL	-0.93	1.35	-2.07	-27.02	22.88	-3.54
VEDL	-1.15	1.23	-2.82	-18.95	21.93	-2.59
Average t - Value			-2.20			-2.15

Table 13 Average t – value matrix of Oil & Gas Sector

	Stock Price			Volume		
Stock Name	Mean	S.D.	t- value	Mean	S.D.	t- value
BPCL	-0.32	1.44	-0.66	-10.92	19.42	-1.69
GAIL	-0.89	1.11	-2.39	-9.58	39.18	-0.73
HINDPETRO	-0.52	1.47	-1.07	-41.23	5.63	-21.96
IGL	0.02	1.11	0.05	-31.03	35.60	-2.62
IOC	-0.46	1.30	-1.05	-20.16	15.90	-3.80
MGL	-0.68	2.07	-0.99	-38.65	18.84	-6.15
ONGC	-1.21	1.98	-1.83	29.81	90.23	0.99
PETRONET	-0.37	0.63	-1.77	-2.68	26.81	-0.30
RELIANCE	-1.05	1.03	-3.08	-4.69	20.02	-0.70
Average t - Value			-1.42			-4.11

Table 14 Average t – value matrix of Paper Sector

	Stock Price			Volume		
Stock Name	Mean	S.D.	t- value	Mean	S.D.	t- value
CENTURYTEX	1.78	1.93	2.77	32.54	122.48	0.80
Average t - Value			2.77			0.80

Table 15 Average t – value matrix of Pharma Sector

	Stock Price			Volume		
Stock Name	Mean	S.D.	t- value	Mean	S.D.	t- value
AUROPHARMA	0.27	2.10	0.39	28.90	218.27	0.40
BIOCON	0.16	1.07	0.46	29.91	84.96	1.06
CIPLA	-0.66	0.72	-2.74	-41.28	32.26	-3.84
DIVISLAB	0.30	0.51	1.80	-15.61	38.32	-1.22
DRREDDY	-0.11	0.84	-0.38	59.49	163.73	1.09
GLENMARK	-1.47	1.68	-2.64	-32.01	18.70	-5.13
LUPIN	-0.46	0.83	-1.64	-32.14	29.32	-3.29
SUNPHARMA	-0.82	0.85	-2.88	-8.30	32.80	-0.76
TORNTPHARM	-1.37	1.81	-2.27	-22.07	93.09	-0.71
Average t - Value			-1.10			-1.38

Table 16 Average t – value matrix of Power Sector

	Stock Price			Volume		
Stock Name	Mean	S.D.	t- value	Mean	S.D.	t- value
NTPC	-0.01	0.62	-0.07	13.07	73.90	0.53
POWERGRID	-0.70	1.44	-1.45	-0.64	44.41	-0.04
TATAPOWER	-0.98	1.48	-1.98	-36.07	70.22	-1.54
TORNTPOWER	-1.37	1.81	-2.27	-16.00	38.24	-1.26
Average t - Value			-1.44			-0.58

Table 17 Average t – value matrix of Service Sector

	Stock Price			Volume		
Stock Name	Mean	S.D.	t- value	Mean	S.D.	t- value
ADANIPORTS	-0.38	1.39	-0.82	-28.86	40.28	-2.15
CONCOR	0.04	1.13	0.10	-16.97	32.14	-1.58
INDIGO	-0.60	1.32	-1.37	-19.76	47.50	-1.25
Average t - Value			-0.70			-1.66

Table 18 Average t – value matrix of Textile Sector

	Stock Price			Volume		
Stock Name	**Mean**	**S.D.**	**t- value**	**Mean**	**S.D.**	**t- value**
PAGEIND	-0.95	0.87	-3.29	-18.54	19.70	-2.82
Average t - Value			-3.29			-2.82

Table 19 Average t – value matrix of Telecom Sector

	Stock Price			Volume		
Stock Name	**Mean**	**S.D.**	**t- value**	**Mean**	**S.D.**	**t- value**
BHARTIARTL	-0.17	1.42	-0.36	-33.84	26.54	-3.82
IDEA	-0.56	2.10	-0.80	-35.06	17.40	-6.04
INFRATEL	0.57	1.41	1.20	-22.91	47.01	-1.46
Average t - Value			-0.58			-4.93

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